

## IN THE CLAIMS

1-86 (canceled)

87. (new) A process for coating a metallic surface that is cleaned, pickled, cleaned or pretreated, with an aqueous composition, also comprising, if desired, organic solvent and other components, which is substantially or entirely free from chromium (VI) compounds, for the purpose of pretreatment prior to a further coating or for treatment, wherein said aqueous composition comprises water and,

- a) at least one of hydrolyzable or at least partly hydrolyzed fluorine-free silane; and
- b) at least one of a hydrolyzable or at least partly hydrolyzed fluorine-containing silane; and
- c) at least one metal chelate; or
- d) at least one monomer/oligomer/polymer/copolymer,

wherein the ratio of the monomer/oligomer/polymer/copolymer of component d) to silanes a) and b) in the composition range from 0.1:1 to 10:1,

wherein the silanes in the composition being water-soluble or becoming water-soluble by virtue of hydrolysis reactions or by chemical reactions prior to application to the metallic surface, wherein the aqueous composition contains at least one fluorine-free organosilane and at least one fluorine-free organofunctional silane, and at least one fluorine-containing organosilane as said fluorine containing silane,

comprising contacting the clean, pickled, cleaned pretreated metallic surface with the aqueous composition to form a film on the metallic surface and subsequently drying and, optionally curing the film,

wherein the dried and optionally cured film is anticorrosive has a thickness in the range from 0.001 to 10  $\mu\text{m}$ , wherein the aqueous composition contains combination of at

least one functional trialkoxysilane, of at least one aminosilane, of at least one ureidosilane or of at least one vinylsilane with at least one bis-trialkoxysilane with at least one fluorine containing silane.

88. (new) The process according to claim 87, wherein the fluorine-free silane selected from the group consisting of at least one acyloxysilane, alkoxysilane, silane having at least one amino group such as an aminoalkylsilane, silane having at least one succinic group and/or succinic anhydride group, bis-silyl-silane, silane having at least one epoxy group such as a glycidylalkoxysilane, (meth)acrylatesilane, multi-silyl-silane, ureidosilane, vinylsilane a silanol, a siloxane or a siloxane that corresponds chemically.

89. (new) The process according to claim 87, wherein said at least one fluorine-free silane is selected from the group consisting of

glycidylalkoxyalkyltrialkoxysilane;  
methacryloyloxyalkyltrialkoxysilane;  
(trialkoxysilyl)alkylsuccinoylsilane;  
aminoalkylaminoalkylalkyldialkoxysilane;  
(epoxycycloalkyl)alkyltrialkoxysilane;  
bis(trialkoxysilylalkyl)amine;  
bis(trialkoxysilyl)ethane;  
(epoxyalkyl)trialkoxysilane;  
aminoalkyltrialkoxysilane;  
ureidoalkyltrialkoxysilane;  
N-(trialkoxysilylalkyl)alkylenediamine;  
N-(aminoalkyl)aminoalkyltrialkoxysilane;

N-(trialkoxysilylalkyl)dialkylenetriamine;  
poly(aminoalkyl)alkyldialkoxysilane;  
tris(trialkoxysilylalkyl) isocyanurate;  
ureidoalkyltrialkoxysilane; and  
acetoxysilane; or is based on any of the foregoing.

90. (new) The process according to claim 87, wherein said at least one silane is selected from the group consisting of

3-glycidyloxypropyltriethoxysilane;  
3-glycidyloxypropyltrimethoxysilane;  
3-methacryloyloxypropyltriethoxysilane;  
3-methacryloyloxypropyltrimethoxysilane;  
3-(triethoxysilyl)propylsuccinoysilane;  
aminoethylaminopropylmethyldiethoxysilane;  
aminoethylaminopropylmethyldimethoxysilane;  
beta-(3,4-epoxycyclohexyl)ethyltriethoxysilane;  
beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane;  
beta-(3,4-epoxycyclohexyl)methyltriethoxysilane;  
beta-(3,4-epoxycyclohexyl)methyltrimethoxysilane;  
gamma-(3,4-epoxycyclohexyl)propyltriethoxysilane;  
gamma-(3,4-epoxycyclohexyl)propyltrimethoxysilane;  
bis(triethoxysilylpropyl)amine;  
bis(trimethoxysilylpropyl)amine;  
(3,4-epoxybutyl)triethoxysilane;

(3,4-epoxybutyl)trimethoxysilane;  
 gamma-aminopropyltriethoxysilane;  
 gamma-aminopropyltrimethoxysilane;  
 gamma-ureidopropyltrialkoxysilane;  
 N-(3-(trimethoxysilyl)propyl)ethylenediamine;  
 N-beta-(aminoethyl)-gamma-aminopropyltriethoxysilane;  
 N-beta-(aminoethyl)-gamma-aminopropyltrimethoxysilane;  
 N-(gamma-trimethoxysilylpropyl)diethylenetriamine;  
 N-(gamma-trimethoxysilylpropyl)diethylenetriamine;  
 N-(gamma-trimethoxysilylpropyl)dimethylenetriamine;  
 N-(gamma-trimethoxysilylpropyl)dimethylenetriamine;  
 poly(aminoalkyl)ethyldialkoxysilane;  
 poly(aminoalkyl)methyldialkoxysilane;  
 tris(3-(triethoxysilyl)propyl) isocyanurate;  
 tris(3-(trimethoxysilyl)propyl) isocyanurate and vinyltriacetoxysilane, or is based on  
 any of the foregoing.

91. (new) The process according to claim 87, wherein in the aqueous composition selected from the fluorine-containing silanes there is in each case at least one acyloxysilane, alkoxysilane, silane having at least one amino group such as an aminoalkylsilane, silane having at least one succinic acid group and/or succinic anhydride group, bis-silyl-silane, silane having at least one epoxy group such as a glycidyloxysilane, (meth)acrylato-silane, multi-silyl-silane, ureidosilane, vinylsilane, a silanol a siloxane or a polysiloxane whose composition corresponds chemically thereto, wherein the group contains at least one fluorine atom.

92. (new) The process according to claim 87, wherein the aqueous composition comprises at least one fluoroalkoxyalkylsilane, at least one mono-, di- or trifunctional fluorosilane, at least one mono-, bis- or tris-fluorosilane, at least one fluorosilane based on ethoxysilane and/or based on methoxysilane and/or at least one fluorosilane having at least one functional group such as, for example, an amino group, in particular in the form of a cocondensate, such as fluoroalkyldialkoxysilane, a fluoroaminoalkylpropyltrialkoxysilane, a fluoromethanesulfonate, a fluoropropylalkyldialkoxysilane, a triphenylfluorosilane, a trialkoxyfluorosilane, a trialkylfluorosilane or a tridecafluorooctyltrialkoxysilane.

93. (new) The process according to claim 87, wherein the silane contains at least two amino groups and also at least one ethyl group and/or at least one methyl group.

94. (new) The process according to claim 87, wherein the aqueous composition further comprises at least one component e) selected from the group consisting of:

- e<sub>1</sub>) at least one inorganic compound in particle form, having an average particle diameter, measured on a scanning electron microscope, in the range from 0.005 to 0.3  $\mu\text{m}$  in diameter;
- e<sub>2</sub>) at least one lubricant;
- e<sub>3</sub>) at least one organic corrosion inhibitor;
- e<sub>4</sub>) at least one anti-corrosion pigment;
- e<sub>5</sub>) at least one agent for neutralizing and/or sterically stabilizing the synthetic resins;
- e<sub>6</sub>) at least one organic solvent;
- e<sub>7</sub>) at least one siloxane;
- e<sub>8</sub>) at least one long-chain alcohol; and

e<sub>9</sub>) at least one surfactant.

95. (new) The process according to claim 87, wherein the organic film former is a synthetic resin mixture comprising at least one polymer or copolymer selected from the group consisting of acrylate, epoxide, ethylene, urea-formaldehyde, phenol, polyester, polyurethane, styrene, styrene-butadiene, vinyl or is based on one of the foregoing.

96. (new) The process according to claim 87, wherein the organic film former further comprises as synthetic resin at least one organic polymer, copolymer and/or mixture thereof selected from the group consisting of polyethyleneimine, polyvinyl alcohol, polyvinylphenol, polyvinylpyrrolidone or polyaspartic acid or is based on one of the foregoing.

97. (new) The process according to claim 87, wherein acid groups of the synthetic resin are stabilized with ammonia, an amine or an alkali metal compound.

98. (new) The process according to claim 87, wherein the aqueous composition contains from 0.1 to 980 g/l of the organic film former.

99. (new) The process according to claim 87, wherein the amount of at least one fluorine-free silane in the aqueous composition, including reaction products formed therefrom, is from 0.05 to 300 g/l.

100. (new) The process according to claim 87, wherein the amount of at least one fluorine-containing silane in the aqueous composition, including the reaction products formed therefrom is from 0.01 to 150 g/l.

101. (new) The process according to claim 87, wherein the at least one metal chelate is selected from the group consisting of chelate complexes based on acetylacetonates, acetoacetic esters, acetonates, alkylenediamines, amines, lactates, carboxylic acids, citrates and/or glycols,

the amount of at least one chelate in the aqueous composition, including any reaction products formed therefrom, being preferably from 0.1 to 80 g/l.

102. (new) The process according to claim 87, wherein the inorganic compound is in particle form as a finely divided powder, a dispersion, a suspension, a colloidal dispersion or amorphous particles.

103. (new) The process according to claim 87, wherein as inorganic compound in particle form particles are added based on at least one of aluminum, of barium, of cerium, of calcium, of lanthanum, of silicon, of titanium, of yttrium, of zinc or of zirconium.

104. (new) The process according to claim 87, wherein as lubricant at least one wax is used selected from the group consisting of paraffins, polyethylenes and polypropylenes, in particular an oxidized wax, the amount of waxes in the aqueous composition being preferably in the range from 0.01 to 5% by weight.

105. (new) The process according to claim 87, wherein the coating is partly produced by drying and filming, or is cured by at least one of actinic radiation, cationic polymerization or thermal crosslinking.

106. (new) The process according to claim 87, wherein the aqueous composition comprises at least one additive selected from the group consisting of a biocide, a defoamer or a wetting agent.

107. (new) The process according to claim 87, wherein the coated metallic surface is dried at a temperature in the range from 20 to 400°C forced-air temperature.

108. (new) The process according to claim 87, wherein the aqueous composition is applied by rolling, flow coating, knife coating, spraying, squirting, brushing or dipping and if desired by subsequent squeezing off with a roller.

109. (new) The process according to claim 87, wherein in each case at least one coating of printing ink, film, paint, paint-like material, powder coating material, adhesive and/or adhesive backing is applied to the dry and also, where appropriate, cured film.

110. (new) The process according to claim 87, wherein the coated metal parts, strips or strip sections are formed, painted, coated with polymers such as PVC, printed, bonded, hot-soldered, welded or joined with one another or with other elements by clinching or other joining techniques.

111. (new) An aqueous composition for pretreating a metallic surface prior to a further coating or for treating the said surface comprising water and at least one of

- a) a hydrolyzable or at least partly hydrolyzed fluorine-free silane;
- b) hydrolyzable or at least partly hydrolyzed fluorine-containing silane;
- c) metal chelate; or
- d) monomer/oligomer/polymer/copolymer;

wherein the ratio of the monomer/oligomer/polymer/copolymer of component d) to silanes (a) and b) in the composition is in the range from 0.1:1 to 10:1;

wherein the proportion of a) to b) in each case including the reaction products formed therefrom being preferably in the range from 1:0.01 to 1:4 and the silanes in the composition being water-soluble or in particular water-soluble due to hydrolysis reactions or chemical reactions and wherein the aqueous composition contains at least one fluorine-free organosilane and at least one fluorine-free organofunctional silane, and at least one fluorine-containing organosilane as said fluorine containing silane and wherein the composition is anticorrosive contains combination of at least one functional



trikoxysilane, of at least one aminosilane, of at least one ureidosilane or of at least one vinylsilane with at least one bis-trikoxysilane with at least one fluorine containing silane.

112. (new) A metallic surface coated by the process as claimed in claim 87, wherein said metallic surface on a substrate is selected from the group consisting of a wire, strip, sheet or part for a wire winding, a wire mesh, a steel strip, a metal sheet, a panel, a shield, a vehicle body or part of a vehicle body, a part of a vehicle, trailer, mobile home or missile, a cover, a casing, a lamp, a light, a traffic light element, a furniture item or furniture element, an element of a household appliance, a frame, a profile, a molding of complex geometry, a guideboard element, radiator element or fencing element, a fender, a pipe, a profile, a window frame, door frame or cycle frame or a small part.

113. (new) The process of claim 87, wherein the composition is applied as an after rinse solution which is applied to a preceding coating.

114. (new) The process of claim 113, wherein the preceding coating is a conversion coating, and/or applied for blank corrosion protection.

115. (new) The process according to claim 96, wherein said film former comprises phosphorous containing vinyl compound.

116. (new) The process of claim 97, wherein said amine is selected from the group consisting of morpholine, dimethylethanolamine, diethylethanolamine, and triethylanolamine.